

REMARKS

Claims 65, 68, 71, 73-75, 81, and 88 are amended. Claims 78080 and 86-87 are cancelled. Claims 65-77, 81-82, 84-85 and 88 are pending in the application.

Claims 65-72, 74-82 and 84-88 stand rejected under 35 U.S.C. § 102(b) as anticipated by either of Eguchi, Japan Patent No. 10287939, or Kardokus, U.S. Patent No. 6,113,761; or in the alternative under 35 U.S.C. § 103(a) as obvious over either of the two references. The Examiner is further reminded by direction to MPEP § 2131 that anticipation requires each and every element of a claim to be taught in a single prior art reference. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. Pending claims 65-72, 74-77, 81-82, 84-85 and 88 are allowable over Eguchi and Kardokus for at least the reason that neither of the references disclose or suggest each and every limitation in any of those claims.

As amended, independent claim 65 recites a physical vapor deposition target consisting essentially of an alloy of copper and from less than 1.0 at% to 0.001 at% silver. Eguchi discloses a copper alloy that contains Cr, Pb and/or Bi, rare earth metal, and which may additionally comprise Zr. In addition to these elements the disclosed copper alloy can also contain Sn, Mg, Ni, Ag, Zn, Si and or Mn (abstract and translation at paragraph 5). Eguchi does not disclose or suggest the claim 65 recited physical vapor deposition target consisting essentially of an alloy of copper and from less than 1.0 at% to 0.001 at% silver. Accordingly, independent claim 65 is not anticipated by or rendered obvious by Eguchi and is allowable over this reference.

Kardokus discloses a high purity copper target of at least about 99.999 wt. % purity and less than 10 ppm of an element which can be any of Ag, Sn, Te, In, Mg, B, Bi, Sb and P (col. 4, ll. 61 through col. 5, ll. 20). Kardokus further discloses that silver can be utilized in the range of from about 0.3 ppm to 10 ppm to allow the copper target to meet the minimum 99.999 wt. % purity grade specifications (col. 5, ll. 20-24). Kardokus does not disclose or suggest the claim 65 recited target consisting essentially of an alloy of copper and from less than 1.0 at% to 0.001 at% silver. Accordingly, independent claim 65 is not anticipated by or rendered obvious by Kardokus and is allowable over this reference.

Dependent claims 66-67 are allowable over each of Eguchi and Kardokus for at least the reason that they depend from allowable base claim 65.

Each of independent claims 68 and 71, as amended, recite a physical vapor deposition target consisting essentially of an alloy of copper and silver, the silver being in present in the alloy at from less than 1.0 at% to 0.001 at%. Independent claims 68 and 71 are allowable over each of Eguchi and Kardokus for at least reasons similar to those discussed above with respect to independent claim 65.

Dependent claims 69, 70 and 72 are allowable over each of Eguchi and Kardokus for at least the reason that they depend from corresponding allowable base claims 68 and 71.

As amended independent claim 74 recites a physical vapor deposition target consisting essentially of copper, from less than 1.0 at% to 0.001 at% Sn and optionally silver. The amendment to claim 74 incorporates the subject matter of previous claim 80. Neither Eguchi nor Kardokus discloses or suggests the recited physical vapor deposition target consisting essentially of copper, the recited content of tin and

optionally silver. Accordingly, independent claim 74 is not anticipated by or rendered obvious by either Eguchi or Kardokus and is allowable over these references.

Dependent claims 78-80 are cancelled. Claim 75 is amended to properly depend from independent claim 74. Dependent claims 75-77 are allowable over Eguchi and Kardokus for at least the reason that they depend from allowable base claim 74.

As amended independent claim 81 recites a physical vapor deposition target consisting essentially of a copper material having at least one of silver and tin and having an electromigration resistance higher than copper having a purity of greater than 99.999% having same grain size. Neither Eguchi nor Kardokus disclose or suggest the claim 81 recited physical vapor deposition target having an electromigration resistance higher than copper of the same grain size having a purity of greater than 99.999%. Independent claim 81 is therefore not anticipated by or rendered obvious by either of Eguchi or Kardokus, and is allowable over these references.

Dependent claims 82, 84 and 85 are allowable over Eguchi and Kardokus for at least the reason that they depend from allowable base claim 81.

With respect to claims 86 and 87, without admission as to the propriety of the present rejection, claims 86 and 87 are cancelled.

As amended, independent claim 88 recites a physical vapor deposition target consisting essentially of a copper alloy containing copper of 99.9998 % purity alloyed with a total concentration of other elements of from less than 1.0 at% to 0.001 at%. As discussed above, neither Eguchi nor Kardokus disclose or suggest the claim 88 recited concentration of alloying elements. Accordingly, independent claim 88 is not anticipated by or rendered obvious by Kardokus or Eguchi and is allowable over these references.

Independent claim 73 stands rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as obvious, over Reda (Amorphous Copper-Silver Films with High Stability, (1983)). As amended, independent claim 73 recites a physical vapor deposition target consisting essentially of an alloy of copper and from 50 at% to 70 at% silver, the target having a substantially uniform microstructure and fine grain size. Reda discloses forming a copper-silver film by cooling a copper-silver vapor onto a substrate. Reda does not disclose a physical vapor deposition target and therefore cannot anticipate claim 73. Additionally, Reda does not disclose, suggest or enable the claim 73 recited target consisting essentially of an alloy of copper and silver and having a substantially uniform microstructure and fine grain size. Accordingly, independent claim 73 is not anticipated by or rendered obvious by Reda and is allowable over this reference.

For the reasons discussed above pending claims 65-77, 81-82, 84-85 and 88 are allowable. Accordingly, applicant respectfully requests formal allowance of such pending claims in the Examiner's next action.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING
 RESPONSE TO JANUARY 13, 2003 FINAL OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

65. (Amended) A physical vapor deposition target consisting essentially of ~~comprising~~ an alloy of copper and silver, the silver being present in the alloy at from less than 1.0 at% to 0.001 at%, the alloy having a substantially uniform microstructure and a fine grain size.

68. (Amended) A physical vapor deposition target consisting essentially of ~~comprising~~ an alloy of copper and silver, the silver being uniformly distributed fine precipitates in the alloy microstructure and being present in the alloy at from less than 1.0 at% to 0.001 at%.

71. (Amended) A physical vapor deposition target consisting essentially of ~~comprising~~ an alloy of copper and silver and having a grain size of less than or equal to about 20 micrometers, the silver being present in the alloy at from less than 1.0 at% to 0.001 at%.

73. (Amended) A physical vapor deposition target consisting essentially of ~~comprising~~ an alloy of copper and silver, the silver being present in the alloy at from 50 at% to 70 at%, the target ~~alloy~~ having a substantially uniform microstructure and a fine grain size.

74. (Amended) A physical vapor deposition target consisting essentially of ~~comprising~~ copper, from less than 1.0 at% to 0.001 at% Sn, and optionally silver, the target and having an average grain size of less than or equal to about 30 micrometers.

75. (Amended) The physical vapor deposition target of claim 74 ~~further~~ comprising silver.

78. (Cancelled)

79. (Cancelled)

80. (Cancelled)

81. (Amended) A physical vapor deposition target consisting essentially of comprising a copper material having at least one element selected from the group consisting of silver and tin, having an average grain size of less than about 30 micrometers, ~~and~~ having an electrical resistivity of from about 1.7 microohms.cm to about 1.82 microohms.cm, and having an electromigration resistance higher than copper of the same grain size having a purity of greater than 99.999%.

86. (Cancelled)

87. (Cancelled)

88. (Amended) A physical vapor deposition target consisting essentially of comprising a copper alloy, the copper alloy containing copper of 99.9998% purity alloyed with a total concentration of other elements of from less than 1.0 at% to 0.001 at%, the other elements being selected from the group consisting of Ag, Sn, Be, Ca, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ti, Zr, Hf, Zn, Cd, B, Ga, In, C, Te, V, Nb, Ta, Cr, W, Mn, Fe, Ru, Os, Co, Rh, Ni, Pd, Pt, Au, and Pb, the copper alloy comprising a substantially uniform microstructure and a fine grain size.

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